


## PCT

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 101.0118PCT	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/GB2004/001223	International filing date (day/month/year) 22.03.2004	Priority date (day/month/year) 23.04.2003	
International Patent Classification (IPC) or national classification and IPC G01F1/688, G01P5/10, G01F1/704, G01K11/32			
Applicant SENSOR HIGHWAY LIMITED et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 25.09.2004		Date of completion of this report 09.03.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Politsch, E  Telephone No. +49 89 2399-8455	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/001223

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-34 as originally filed

**Claims, Numbers**

1-64 as originally filed

**Drawings, Sheets**

1/9-9/9 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/001223

**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application,
  - ☒ claims Nos. 61-64  
because:
    - ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
    - ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
    - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
  - ☒ no international search report has been established for the said claims Nos. 61-64
  - ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
    - the written form ☐ has not been furnished
    - ☐ does not comply with the standard
    - the computer readable form ☐ has not been furnished
    - ☐ does not comply with the standard
  - ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.
  - ☐ See separate sheet for further details

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/001223

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

Novelty (N)	Yes: Claims	4-16, 25, 29-42, 51-60
	No: Claims	1-3, 17-24, 26-28, 43-50
Inventive step (IS)	Yes: Claims	7, 8, 33, 34
	No: Claims	4-6, 9-16, 25-32, 35-42, 51-60
Industrial applicability (IA)	Yes: Claims	1-60
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

---

**Box No. VII Certain defects in the international application**

---

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

---

**Box No. VIII Certain observations on the international application**

---

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

## **1. CITED DOCUMENTS**

The following documents cited in the International Search Report are referred to in this opinion:

- D1: US-A-4 621 929 (PHILLIPS STEPHEN R) 11 November 1986 (1986-11-11)
- D2: WO 00/11317 A (WILLIAMS GLYNN; NEUROTH DAVID H (US); BAKER HUGHES INC (US); DALRYMPL) 2 March 2000 (2000-03-02)
- D3: DE 298 21 223 U (GTC KAPPELMEYER GMBH) 1 April 1999 (1999-04-01)
- D4: BOBB L C ET AL: "An optical fiber hot-wire anemometer" PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING USA, vol. 1169, 1990, pages 567-572, XP009036558 ISSN: 0277-786X
- D5: US-A-5 004 913 (KLEINERMAN MARCOS) 2 April 1991 (1991-04-02)

## **2. REMARKS ON V. REASONED STATEMENT UNDER RULE 66.2(a)(ii) WITH REGARD TO NOVELTY, INVENTIVE STEP OR INDUSTRIAL APPLICABILITY**

### **Articles 33(2), (3) PCT**

The subject-matter of claims 1-3, 17-24, 26-28, 43-50 is not new in the sense of Article 33(2) PCT.

The subject-matter of claims 4-6, 9-16, 25, 29-32, 35-42, 51-60 appears to lack an inventive step in the sense of Article 33(3) PCT.

The subject-matter of claims 7, 8, 33, 34 is not hinted at, or rendered obvious by, the presently available prior art.

### **2.1 Claim 1 (and corresponding claim 26)**

Document D1, which concerns a fiber optic thermal anemometer, discloses a method of monitoring fluid flow comprising:

- providing an optical fibre having a heatable coating (absorption layer 56 or phosphor element 55, see e.g. Figs. 4A and 4G; col. 51-57);
- disposing the optical fibre so that the heatable coating is in thermal contact with flowing fluid;
- heating the heatable coating so that heat is transferred from the coating to the fluid (see, e.g., col. 10, l. 49-51);
- launching light into the optical fibre (col. 7, l. 42-45);
- detecting light from the optical fibre (see loc. cit.);
- processing the detected light to obtain information indicative of the temperature of

the heatable coating; where the temperature of the heatable coating depends on the flow (col. 11, l. 1-5); and

using the information indicative of the temperature of the heatable coating to derive information about the flow (loc. cit.).

Therefore, the subject-matter of claim 1 (and the corresponding entity claim 26) is not new.

## 2.2 Claims 2, 27, 28

The method according to D1 is apparently also used for flow metering.

## 2.3 Claims 3, 29

See Fig. 8 and col. 13, section 'Gas Analysis'.

## 2.4 Claims 4, 5, 30, 31; 53 (cf. remark on claim 52 below)

The skilled person knowing the method and apparatus according to document D2 (see claim 1) would consider the alternative heating method according to document D4 in order to achieve a more compact arrangement with better heat coupling between heater cable and fiber optic string, thus arriving at a conductor coated fiber. Moreover, document D3 discloses a sheathed optical fiber which has the same structure as the coated fiber according to the instant application; although there is no explicit mention of a coating, at least the penultimate paragraph on p. 6 leads the skilled person aware of document D4 to the subject-matter of claim 4. Furthermore, the sheath according to D3 could also be regarded as a kind of coating.

## 2.5 Claim 6, 32

The provision of an electrically insulating coating comes within the scope of customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of claims 6 and 32 also appears to lack an inventive step.

## 2.6 Claims 9, 12-16, 35, 38, 39-42, 54-57, 60

The fibres according to D2 or D3 are also operated as distributed temperature sensors and they are used to indicate locations of fluid flow changes (e.g. inflow or outflow of fluid, flow changes due to scale caused constrictions, etc.), too.

## 2.7 Claims 10, 11, 36, 37, 58, 59

The distinct response of the fibre optic sensor to different media – and hence its

applicability to infer the composition of the fluid – is clear from document D3, p. 5, last paragraph.

2.8 Claims 17-19, 43-45

Cf. document D1.

2.9 Claims 20-22, 46-48

See second paragraph in col. 7 of D1.

2.10 Claim 23, 49

See penultimate paragraph in column 8 and Fig. 4G of document D1.

2.11 Claim 24, 50

See Fig. 4A and second paragraph in col. 8 of D1.

2.12 Claim 25, 51, 52

It is clear that the sensor according to D1 can be disposed within a well bore, for instance. Such specific application cannot be regarded as involving an inventive step. Moreover, a combination of documents D2 and D4 or D3 and D4, respectively, also yields methods and sensors for oil well utilization. Hence, the subject-matter of claims 25, 51, 52 does, at least, not involve an inventive step.

### **3. REMARKS ON VII. CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION**

3.1 The independent claims should be in the two-part form in accordance with Rule 6.3(b) PCT, with those features known in combination from the prior art (one of documents D1-D3) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

3.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D3-D5 is not mentioned in the description, nor are these documents identified therein.

**4. REMARKS ON VIII. CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION**

**Lack of clarity (Article 6 PCT)**

**4.1 Claim 51**

The fact that the optical fibre is deployed within a well bore is obviously not a feature of the probe and is hence not suited to define the probe.

**4.2 Claims 53 and 55**

Claim 53 refers to claim 51, claim 55 refers to claims 51 to 54; it appears that they should refer to claims 51 and 53 to 54, respectively.